

Colorado Immunization Manual

SECTION 18

Strategies to Improve Vaccine Coverage



Colorado Immunization Manual

ISSUED: 9/1/98

REVISED: 4/1/01

SECTION-PAGE: 18-1

SUBJECT: STRATEGIES TO IMPROVE VACCINE COVERAGE

SECTION 18

Strategies to Improve Vaccine Coverage

Colorado Immunization Manual

ISSUED: 9/1/98

REVISED: 7/1/05

SECTION-PAGE: 18-2

SUBJECT: STRATEGIES TO IMPROVE VACCINE COVERAGE

Things You Can Do Now To Improve Immunization Levels Of Colorado's Two-Year-Olds.

1. **EDUCATE** your staff. There are free classes and services available to help your staff improve their skills and remain current.
2. **ASSESS** the immunization status of every child on every visit. Up-to-date? Vaccinate!
3. **PARTICIPATE** in the Vaccines For Children (VFC) program, which allows you to obtain free vaccine for all children on Medicaid, or who do not have health insurance coverage.
4. **START** a reminder system to let parents know when their children are due for shots. It can be as easy as giving a parent a reminder card to complete in the office so that it can be sent out before the next visit, CIIS, etc.
5. **DETERMINE** the current level of immunization in your practice with a free assessment.
6. **IDENTIFY** barriers in your practice and take steps to remove them (hours, scheduling, requirements, invalid contraindications, etc.)
7. **JOIN** with others in your community. Coalitions to improve immunizations are active at the state and local levels. Contact the Colorado Children's Immunization Coalition for more information 303-864-5340.
8. Use **Colorado Immunization Information System (CIIS)**.

The Colorado Department of Public Health & Environment, Immunization Program, can help you with all of these things. Contact us at 303-692-2650 or 800-866-7689 x2650.

Strategies for Increasing Vaccination Rates

Childhood immunization rates are suboptimal. For example, the 4:3:1:3* rate of coverage for Colorado was 73.2 % (+/- 6.1%) for the period of July 2003 to June 2004. The national rate of coverage for the U.S. was 82.3% (+/- 0.9%) during the same period.

*4:3:1:3 series = Four or more doses of DTP, three or more doses of poliovirus vaccine, one or more doses of any MCV, and three or more doses of Hib.

Many available strategies work to increase immunization. The value of a strategy depends upon its implementation, its potential effectiveness, and how well it is matched to existing problems. Consider implementing the following options in your practice:

- **Reminders** Reminder and recall efforts have been found to be effective in increasing vaccination rates in various settings. Generally, mail and telephone reminders are equally effective.

Chart reminders can range from a colorful sticker to a comprehensive checklist. These reminders can be placed in prominent positions in the charts of patients, indicating that they will need vaccines at the next visit. Samples include a posted note “No XXXX vaccine on record” that is stamped by a receptionist onto the chart where the nurse will see the notation; an “Immunization Due” clip that is attached to the chart of an adolescent that needs a vaccine.

Daily patient list—An office computer can be programmed to print a daily list of patients with that are scheduled for an appointment that may need vaccines at their visit.

Telephoned Reminders—Office staff can call parents to remind them of their appointment. See sample script.

Mailed Reminders A postcard or letter can be sent reminding parents to bring their child in for needed vaccinations. Patients are offered the opportunity to schedule an appointment. Reminder postcards are available free of charge in English and Spanish through the Colorado Immunization Program. See sample postcards.

- **Expanding Access in Clinical Settings**
Offering “drop-in” clinics, “express lane,” “nurse-only visits” vaccination services, Saturday clinics, are some ways to expand vaccination services. See sample office notice.
- **Personal Health Records**
These records help parents keep track of their child’s vaccinations that they have received and can indicate when additional vaccinations are needed. Immunization records are available free of charge for Children and Adults through the Colorado Immunization Program. See sample records.
- **Good office record keeping.** Easy-to-read immunization chart records that are available at the time of the visit are essential. Putting in place a system that ensures a front sheet that is available and kept current. Immunization chart records are available free of charge for Children and Adults through the Colorado Immunization Program. See sample chart records.
- **Standing Orders** are helpful during influenza campaigns when a large number of people need vaccination, and an individual physician’s order for each patient is impractical.
- **Review the literature** can provide additional information for potential strategies and opportunities in your clinic. See the attached articles and reference list.

- **Performance Feedback**

This strategy can inform providers about the number and percent of total children vaccinated. During influenza season, physicians can use a wall chart to track the number of patients vaccinated and measure the actual number vaccinated against an established goal. Physicians can also ask office staff to randomly select patient charts and review them for immunization coverage. These samples of coverage can be used to indicate immunization coverage across the practice.

Sample for Computerized Record Reminder

Vaccinations Due Report

Patients with appointments scheduled for: November 5, _____

Patients's Name	Vaccine Needed	Appointment Time
Jane Doe	IPV DTaP Prevnar	2:00 P.M.
John Doe	MMR Varicella	2:30 P.M.

Sample Telephoned Reminder Script

Hello, I'm calling for Dr. _____. May I speak to (parent's name)?

I'm calling to remind you that it is time for your child to receive vaccinations to protect them. Are you able to come in at _____ o'clock on _____ (month, day)?

[Schedule appointment]

Instructions to the Health Care Provider: Fold this card in half (fold this top part down) with the information below on the inside. Seal with a sticker, staple, or piece of tape. Address the blank side of the card. Mail using first-class postage, as you would an envelope.
REMEMBER: YOUR NOTICE OF PRIVACY PRACTICE MUST STATE THAT REMINDERS WILL BE SENT.

You remember to protect your child's head.



What about the rest of their body?

-----FOLD HERE-----

REMEMBER IMMUNIZATIONS.

Our records show that _____ needs to receive the following immunizations:

- | | | |
|-------------------------------|-----------------------------------|-----------------------------------|
| <input type="radio"/> DTaP | <input type="radio"/> Hepatitis A | <input type="radio"/> Hepatitis B |
| <input type="radio"/> Hib | <input type="radio"/> MMR | <input type="radio"/> Polio |
| <input type="radio"/> Prevnar | <input type="radio"/> Td | <input type="radio"/> Varicella |

Your child can receive these shots at:



Colorado Department
of Public Health
and Environment

If your child has already received any of these, please call us to update our records.

According to federal law, no person may be denied vaccine purchased with federal immunization grant funds for failure to pay an administration fee or failure to make a donation to the provider.

Instructions to the Health Care Provider: Fold this card in half (fold this top part down) with the information below on the inside. Seal with a sticker, staple, or piece of tape. Address the blank side of the card. Mail using first-class postage, as you would an envelope.
REMEMBER: YOUR NOTICE OF PRIVACY PRACTICE MUST STATE THAT REMINDERS WILL BE SENT.

Usted se acuerda de proteger la cabeza de su niño.



¿Y que tal el resto de su cuerpo?

-----FOLD HERE-----

ACUÉRDESE DE LAS VACUNAS.

Nuestros registros indican que _____ necesita recibir las siguientes inmunizaciones (vacunas):

- | | | |
|-------------------------------|-----------------------------------|-----------------------------------|
| <input type="radio"/> DTaP | <input type="radio"/> Hepatitis A | <input type="radio"/> Hepatitis B |
| <input type="radio"/> Hib | <input type="radio"/> MMR | <input type="radio"/> Polio |
| <input type="radio"/> Prevnar | <input type="radio"/> Td | <input type="radio"/> Varicella |

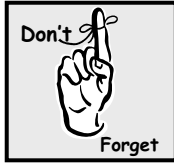
Su niño(a) puede recibir estas vacunas en:



Colorado Department
of Public Health
and Environment

Si su niño(a) ya recibió estas vacunas, por favor llámenos para actualizar nuestra documentación.

De acuerdo con la ley federal, a ninguna persona puede negársele vacuna comprada con fondos de la subvención federal para inmunizaciones, por incumplimiento de pago del costo de administración o incumplimiento en hacer una donación al proveedor.



AN IMMUNIZED CHILD IS A HEALTHY, HAPPY CHILD

Our records show that _____
may need to receive immunizations. Please call us to make sure your
child has received all of his/her needed immunizations.

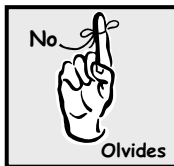
Provider name: _____

Telephone number: _____



If you do not want to continue receiving reminder notices, please let us know.

*According to federal law, no person may be denied vaccine purchased with
federal immunization grant funds for failure to pay an administration fee or failure to
make a donation to the provider.*



**UN NIÑO INMUNIZADO
ES UN NIÑO SALUDABLE Y FELIZ**

Nuestra documentación muestra que _____
pueda necesitar recibir inmunizaciones. Por favor llámenos para asegurarse que
su niño(a) haya recibido todas las inmunizaciones necesarias.

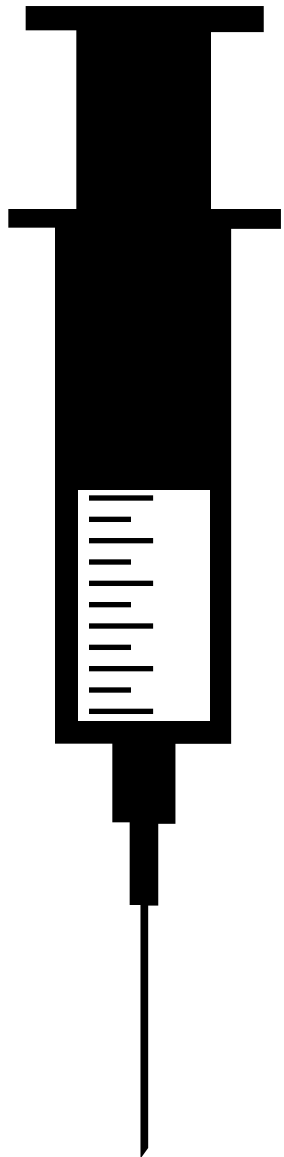
Nombre del Proveedor: _____

Número de Teléfono: _____



Si no desea continuar recibiendo notificaciones para recordarle, por favor avísenos.

*De acuerdo con la ley federal, a ninguna persona puede negársele vacuna comprada con
fondos de la subvención federal para inmunizaciones, por incumplimiento de pago del costo
de administración o incumplimiento de hacer donaciones al proveedor.*



We Now Offer

Saturday Immunization Clinics

**From 10:00 a.m.
to 2:00 p.m.**

*Ask about shots
you may need at
the check-in desk.*

PRESENT THIS RECORD AT EACH VISIT
En Cada Visita Muestre este Registro de Inmunizacion

1. Children need to be immunized when they are babies. They need most of their immunizations before they are two years old, starting when they are born.
2. Colorado law requires proof of immunization or exemption before a child enters a school or day care center.
3. If you have questions or need to know where you can get immunizations for your children, call your doctor or county health department or the Family Healthline: 303/692-2229 in metro Denver or toll-free statewide 1/800/688-7777. (Se habla español.)

IMPORTANT NOTES

Age	Hep B #1	Hep B #2	Hep B #3	DTaP	Hib	IPV	MMR #1	MMR #2	TD	Hep A series
Birth										
1 Month										
2 Months										
4 Months										
6 Months										
12 Months										
15 Months										
18 Months										
24 Months										
4-6 Years										
11-12 Years										
13-18 Years										

Age for Routine Administration
 Colorado Department of Public Health and Environment/Colorado Clinical Guidelines Collaborative

IMMUNIZATION RECORD
REGISTRO DE INMUNIZACION

NAME
Nombre _____

DATE OF BIRTH
Fecha De Nacimiento _____

ALLERGIES
Alergias _____



Your child must comply with Colorado's immunization law to be enrolled in school. Retain this document as proof of immunization.

VACCINE vacuna		VACCINE TYPE	DATE GIVEN <i>dada en la fecha</i>	DOCTOR OR CLINIC <i>doctor o clinica</i>	DATE NEXT DUE <i>próxima vacuna</i>
HB Hepatitis B	1				
	2				
	3				
DTaP/DT Diphtheria, Tetanus & Pertussis <i>Difteria, Tetanos y Tos Ferina</i>	1				
	2				
	3				
	4				
	5				
Hib Haemophilus b <i>Haemophilus b</i>	1				
	2				
	3				
	4				
IPV Poliovirus <i>Poliomielitis</i>	1				
	2				
	3				
	4				
PCV7 Pneumococcal Conjugate (7-valent)	1				
	2				
	3				
	4				
MMR Measles Mumps Rubella	1				
	2				
Varicella <i>Varicela</i>	1				
	2				
Had chickenpox disease <input type="checkbox"/> Date: _____					
Td/Tdap Tetanus/ Diphtheria <i>Tetano/ Difteria</i>	1				
	2				
Hep A Hepatitis A	1				
	2				
OTHER	1				
	2				
	3				

IRC-RC7 November 2005

This is your record, keep it in a safe place.



Birthdate _____

Name _____

ADULT IMMUNIZATION RECORD

COLORADO DEPARTMENT OF PUBLIC HEALTH & ENVIRONMENT

Vaccinations for Adults—You're NEVER too old to get shots!

Many adults don't know they are supposed to get immunized against diseases. They think vaccinations are for kids. There are millions of adults in this country who need influenza, pneumococcal, tetanus, diphtheria, hepatitis B, and other vaccines. Are you one of them? Getting immunized is a lifelong, life-protecting job. Make sure you and your health professional keep your vaccinations up to date! Don't leave your doctor's office without making sure that you've had all the vaccinations you need.

Influenza "flu shot."	The "flu shot" is recommended every fall for people age 50 or older; women who will be in their 2 nd or 3 rd trimester of pregnancy during flu season; residents of long-term care facilities; people younger than 50 who have medical problems such as heart or lung disease (including asthma), diabetes, kidney disease, or an immune system weakened by disease or medication; and those who work with or live with any of these individuals.		
Pneumococcal "pneumococcal shot"	The "pneumococcal shot" is recommended one time at age 65 (or older if it was not given at 65). This shot is also recommended for people younger than 65 who have certain chronic illnesses. Some individuals with particular health risks will need a one-time revaccination dose 5 years later. Consult your doctor.		
Tetanus, diphtheria (Td) often referred to as "tetanus shot"	If you haven't had at least 3 basic tetanus-diphtheria shots in your lifetime, you need to complete the series listed below:		And then all adults need a booster dose every 10 years.
	dose #1 now	dose #2 1 month later	
Hepatitis A (Hep A) for those at risk*†	Hepatitis A vaccine is recommended for many adults, including travelers to certain areas outside the U.S.*		
	dose #1 now		dose #2 is usually given 6 months after dose #1
Hepatitis B (Hep B) for those at risk*†	dose #1 now	dose #2 1 month later	dose #3 is usually given 5 months after dose #2
	One dose is recommended for those born in 1957 or later if that person has not been previously vaccinated. (A second dose of MMR may be required in some work or school settings, or recommended for international travel.) People born before 1957 are usually considered immune.		
Measles, mumps, rubella (MMR)	This vaccine is recommended for those who have never had chickenpox.		
	dose #1 now		dose #2 1–2 months later
Meningococcal for those at risk*	If you are a young adult going to college, ask your doctor about your risk of meningococcal disease and your need for vaccination.		

* Consult your health professional to determine your level of risk for infection and your need for this vaccine.

† If you need both hepatitis A and B vaccines, a combination product is available which is given on a 3-dose schedule. Consult your health professional.

Vaccine	Date	Clinic/Physician/Mfg/Lot #
Varicella		
	Had chickenpox disease <input type="checkbox"/> Date: _____	
Tetanus Diphtheria (Td/Tdap) After initial series, booster every 10 years)		
Measles, Mumps, Rubella (MMR)		
Hepatitis B		
Hepatitis A		
Pneumococcal		
Smallpox		
Take Date: _____ <input type="checkbox"/> Major <input type="checkbox"/> Equivocal <input type="checkbox"/> No Response		
Other		

Influenza (Annually for elderly, chronically ill, or anyone wanting to reduce likelihood of influenza)				

Provider Name _____

Provider Address _____ City _____ ZIP _____

Immunization Administration Record Sheet/ Approved Colorado Certificate of Immunization

Colorado Department of Public Health and Environment

Name _____ DOB _____ Parent _____

Address _____ City _____ ZIP _____ Phone _____

VFC Qualified: Yes No If Yes, check one: Medicaid, American Indian or Alaskan Native, No Insurance,
 Has health insurance that does not pay for vaccines (applies only to FQHCs and rural health centers)

I have read or have had explained to me the information contained in the Vaccine Information Statement(s) about the disease(s) and the vaccine(s). I have had a chance to ask questions which were answered to my satisfaction. I believe I understand the benefits and risks of the vaccine(s) and request that the vaccine(s) indicated below be given to me or to the person named above for whom I am authorized to make this request.

Vaccine	Signature ¹	Immun. Date	Site Given ²	Manufacturer/ Lot Number	VIS & Date ³	Date VIS Given ⁴	Administered By (Name/Title)
Hep B-1							
Hep B-2							
Hep B-3							
DTaP/DTP/DT-1							
DTaP/DTP/DT-2							
DTaP/DTP/DT-3							
DTaP/DTP/DT-4							
DTaP/DTP/DT-5							
Hib-1							
Hib-2							
Hib-3							
Hib-4							
IPV/OPV-1							
IPV/OPV-2							
IPV/OPV-3							
IPV/OPV-4							
MMR-1							
MMR-2							
Var-1							
Var-2							
Varicella Disease:	yes <input type="checkbox"/> Date: _____ (Record dates Varicella vaccines were given OR date of disease occurrence.)						

(continues on back)

¹Signature: Parent, guardian, emancipated student/consenting minor, adult
²Site Given Legend: RA=Right Arm, LA=Left Arm, RT=Right Thigh, LT=Left Thigh, O=Oral
³VIS & Date: Type & revision date of Vaccine Information Statement given to parent e.g., MMR 1/15/03
⁴Date VIS Given: Date of which patient, parent or guardian was given Vaccine Information Sheet

Name _____ DOB _____

I have read or have had explained to me the information contained in the Vaccine Information Statement(s) about the disease(s) and the vaccine(s). I have had a chance to ask questions which were answered to my satisfaction. I believe I understand the benefits and risks of the vaccine(s) and request that the vaccine(s) indicated below be given to me or to the person named above for whom I am authorized to make this request.

Vaccine	Signature ¹	Immun. Date	Site Given ²	Manufacturer/ Lot Number	VIS & Date ³	Date VIS Given ⁴	Administered By (Name/Title)
Pneumococcal Conjugate-1							
Pneumococcal Conjugate-2							
Pneumococcal Conjugate-3							
Pneumococcal Conjugate-4							
Hep A-1							
Hep A-2							
Meningococcal Conjugate							
Td/Tdap-1							
Td/Tdap-2							
Td/Tdap-3							
Pneumococcal Polysaccharide-1							
Pneumococcal Polysaccharide-2							
Meningococcal Polysaccharide-1							
Meningococcal Polysaccharide-2							
Influenza							

¹Signature: Parent, guardian, emancipated student/consenting minor, adult
²Site Given Legend: RA=Right Arm, LA=Left Arm, RT=Right Thigh, LT=Left Thigh, O=Oral
³VIS & Date: Type & revision date of Vaccine Information Statement given to parent e.g., MMR 1/15/03
⁴Date VIS Given: Date of which patient, parent or guardian was given Vaccine Information Sheet

TO THE BEST OF MY KNOWLEDGE, THE PERSON NAMED ABOVE HAS RECEIVED THE IMMUNIZATIONS REQUIRED FOR SCHOOL/CHILD CARE ENTRY

DO NOT SIGN UNLESS MINIMUM IMMUNIZATION REQUIREMENTS FOR AGE OR GRADE ARE MET

Signed _____ Title _____ Date _____
 (Physician, nurse or school health authority)

STATEMENT OF EXEMPTION TO IMMUNIZATION LAW (DECLARACIÓN RESPECTO A LAS EXENCIONES DE LA LEY DE VACUNACIÓN)

IN THE EVENT OF AN OUTBREAK, EXEMPTED PERSONS MAY BE SUBJECT TO EXCLUSION FROM SCHOOL AND TO QUARANTINE. SI SE PRESENTA UN BROTE DE LA ENFERMEDAD, ES POSIBLE QUE A LAS PERSONAS EXENTAS SE LES PONGA EN CUARENTENA O SE LES EXCLUYA DE LA ESCUELA.

MEDICAL EXEMPTION: The physical condition of the above named person is such that immunization would endanger life or health or is medically contraindicated due to other medical conditions.

EXENCIÓN POR RAZONES MÉDICAS: El estado de salud de la persona arriba citada es tal que la vacunación significa un riesgo para su salud o incluso su vida; o bien, las vacunas están contraindicadas debido a otros problemas de salud.

*Medical exemption to the following vaccine(s):
 La exención por razones médicas aplica a la(s) siguiente(s) vacuna(s):*

Signed (Firma) _____ Date (Fecha) _____
 Physician (Médico)

RELIGIOUS EXEMPTION: Parent or guardian of the above named person or the person himself/herself is an adherent to a religious belief opposed to immunizations.

EXENCIÓN POR MOTIVOS RELIGIOSOS: El padre o tutor de la persona arriba citada, o la persona misma, pertenece a una religión que se opone a la inmunización.

*Religious exemption to the following vaccine(s):
 Exención por motivos religiosos de la(s) siguiente(s) vacuna(s):*

Signed (Firma) _____ Date (Fecha) _____
 Parent, guardian, emancipated student/consenting minor
 (Padre, tutor, estudiante emancipado o consentimiento del menor)

PERSONAL EXEMPTION: Parent or guardian of the above named person or the person himself/herself is an adherent to a personal belief opposed to immunizations.

EXENCIÓN POR CREENCIAS PERSONALES: Las creencias personales del padre o tutor de la persona arriba citada, o la persona misma, se oponen a la inmunización.

*Personal exemption to the following vaccine(s):
 Exención por creencias personales de la(s) siguiente(s) vacuna(s):*

Signed (Firma) _____ Date (Fecha) _____
 Parent, guardian, emancipated student/consenting minor
 (Padre, tutor, estudiante emancipado o consentimiento del menor)

EDITORIALS

The challenge of vaccinating vulnerable children

Mortality and morbidity from vaccine-preventable diseases of children are at record low levels today because vaccination coverage rates among preschool children are at or near record high levels.¹ Barriers to routine childhood vaccination have been identified and substantially lowered by government and private sector initiatives in the decade after the measles resurgence of 1989 to 1991. New knowledge about interventions to raise vaccination coverage levels has been acquired, and systematic reviews of this knowledge have led to recommendations to clinicians on techniques to improve their immunization practices.² The private and public partnership of the nation's immunization system has achieved such remarkable success that childhood deaths from diseases preventable through routine immunization are very unusual.

Although the picture appears rosy, it is not nearly as good as it should or could be. Two articles in this issue of *The Journal* highlight important problems. Vivier et al³ found that immunization coverage levels for poor children in Rhode Island who have documented access to a primary care provider are comparable to those of

their peers from wealthier families. However, they note, "there is still room for substantial improvement." Kempe et al⁴ implemented and evaluated an immunization recall system, one of the most well-studied and robust interventions to raise and sustain immunization coverage levels, and found almost no positive impact. The importance of the study by Kempe et al⁴ is that the investigators looked beyond efficacy: they also investigated reasons for failure, and it is this information that most advances the literature.

See related articles, p 624 and p 630.

Let us start with barriers to immunization. The most pervasive and consistent family factor associated with low vaccination coverage levels is poverty. Nationally, there was a 13.6 percentage point difference in coverage levels across the poverty line in 1996 and a 10.0 percentage point difference in 1999.⁵ However, Vivier et al³ demonstrated that poverty is not an insurmountable barrier to routine immunizations. This is a very important study because it helps establish the principle that statewide systems can help vulnerable children get the protection from vaccine-preventable diseases that they need. If Rhode Island can do it, other states can also. Systems and interventions will vary by state and by provider, but it helps to know that it is possible to level the playing field.

Two contributing explanations for the high rates of coverage found by Vivier et al³ may be that Rhode Island's Medicaid Program has a special emphasis on enhanced access to care and a strong relationship with a primary care provider and that the study was confined to a subset of children continuously enrolled in Medicaid for a 12-month period. Thus, the children in the study group had excellent access to primary care and to vaccines. What is unknown is what fraction of all same-age Medicaid enrollees this represents. One might expect those *not* continuously enrolled in Medicaid to be less well vaccinated because they may have had an interruption in their immunization benefits. Therefore, the high coverage levels found in this study may not generalize to the entire population of Medicaid-enrolled preschoolers in Rhode Island.

Vivier et al³ found that other socioeconomic factors did not predict immunization coverage but that provider type did. This key finding may reflect the importance of provider practices in achieving high vaccination coverage levels. Although Vivier et al³ did not collect information about specific interventions used to raise vaccination coverage in the practices, it seems logical that the use of interventions varies by type of provider site because of differences in practice policies and availability of resources. Variation in immunization performance by provider type indicates the need to understand provider-based interventions and the capacity to con-

Reprint requests: Lance E. Rodewald, MD, National Immunization Program, 1600 Clifton Rd, Mailstop E-52, Atlanta, GA 30333.

J Pediatr 2001;139:613-5.

Copyright © 2001 by Mosby, Inc.

0022-3476/2001/\$35.00 + 0 9/18/119467

doi:10.1067/mpd.2001.119467

duct those interventions—a lead-in to the study by Kempe et al,⁴ which changes the focus of discussion from state to provider.

There is ample evidence that provider practices are a key determinant of vaccination coverage among preschool children. Provider practices are more important barriers to vaccination than parental attitudes toward immunization.⁶ In the 1990s, many immunization health services research studies on methods to raise and sustain vaccination coverage levels were conducted. Systematic reviews of this research have highlighted the prominence of reminder/recall systems⁷⁻⁹; these systems make sense and have been shown to work in many different settings, and the major federal advisory bodies for childhood immunization have strongly recommended their use.¹⁰⁻¹² How does the study by Kempe et al⁴ square with the literature?

Kempe et al⁴ measured the efficacy of a very short (2-month), pure recall protocol to bring children up to date. Their study population was confined to children in need of at least one vaccination, and the utilization rates they found for the study children (less than 4 clinic visits of any type during the first year of life) indicate that these children were low utilizers of their pediatricians' services—for both illness visits and health maintenance visits. The investigators' protocol (a postcard followed by up to 4 telephone calls) did not bring children up to date on vaccinations at a rate greater than expected by chance and usual practice. The authors concluded that the success of their intervention was blunted by several potentially remediable factors not addressed in their study: inability to reach one third of the intervention group, lack of complete immunization information in the primary care provider's records, and missed immunization opportunities.

What is needed to optimize the reminder/recall process? Because the

intervention is based on information, one must know which children need to be vaccinated and how to contact the caretakers of those children. The thoughtful discussion by Kempe et al⁴ shows problems with both of these information needs. Because the clinic had incomplete vaccination records, staff members were unable to be specific about which children to recall. Scattered immunization records are a known barrier to effective immunization practices.¹² Immunization registries that can coalesce records across practices are long-term solutions to this national problem, but until registries become fully operational, agreements are needed to communicate when vaccinations are given by one provider to another provider's patient. Such agreements are particularly necessary between health department clinics and private providers because underinsured children are frequently referred to health departments for vaccination.

Because the investigators had incorrect contact information for one third of their study population, the protocol had a built-in limitation on its potential effectiveness. Their recommendation to use all visit registrations to the clinic to update contact information is sound advice. However, even with adequate information, provider practices can limit the impact of recall. Fully one quarter of patients who were successfully recalled to the office were not vaccinated during that visit. An intervention to reduce missed vaccination opportunities may enhance the success of recall interventions.

Provider-based strategies often require participation from the entire office staff—those who schedule appointments, those who prepare patient charts, and the health care providers. The fact that both intervention and control groups were drawn from the same practice may have reduced the efficacy of the intervention. For example, it may be more difficult to achieve the level of aware-

ness and participation among all staff members during such a trial than when all patients are being treated similarly, particularly in a busy teaching clinic in which a large number of providers are involved.

Another factor possibly related to the failure of their intervention not mentioned by Kempe et al⁴ is the duration and intensity of the protocol. It may be that connecting mobile young families with their pediatric clinic requires a more sustained, systematic effort than the 2-month protocol allowed. More intensive recall systems exist but are more expensive to implement.^{13,14} However, additional benefit may be derived from intensive systems if other clinical preventive services are included in a recall system. Because underimmunized children are also at much greater risk for failure to receive other clinical preventive services,^{15,16} additional benefit could be expected when these children are called back or referred to their primary care provider's office for overdue immunizations.^{17,18}

Immunization reminder/recall systems are powerful interventions to raise and sustain immunization coverage levels. Kempe et al's⁴ study of an ineffective recall system provides clues to the minimum platform needed for success and for further investigation. Other research needs include an understanding of the barriers to the use of reminder/recall systems so that strategies may be developed to address and minimize these barriers. Critical components of the reminder/recall process, as well as the costs of these components, must be identified. Making the transition from experimental studies to widespread implementation of reminder/recall systems among private providers will require the development of a catalogue of effective reminder/recall systems. Finally, further study is needed to determine what role the growing network of community immunization registries can play in supporting providers to implement reminder/recall systems.

What assistance is currently available for providers in implementing strategies to raise vaccination coverage levels in their practices? Assistance with quality improvement activities is available through state and local immunization programs. For example, providers enrolled in the Vaccines for Children Program are currently being targeted by state-based immunization programs to receive provider site visits that include technical assistance with quality improvement activities.

Despite the intuitive appeal of prevention activities, the prevention of many illnesses, disorders, and syndromes is still beyond the reach of modern medical science. Vaccine-preventable disease is one area in which we not only have effective tools (ie, vaccines) for prevention but also evidence-based strategies for the best means of delivery. Let us conduct the research and implement the systems to reach all children.

Lance E. Rodewald, MD

Jeanne M. Santoli, MD, MPH

National Immunization Program

Centers for Disease Control and Prevention

Atlanta, GA 30333

REFERENCES

- Centers for Disease Control and Prevention. National, state, and urban area vaccination coverage levels among children aged 19–35 months—United States, 2000. *MMWR Morb Mortal Wkly Rep* 2001;50:637-41.
- Task Force on Community Preventive Services. Recommendations regarding interventions to improve vaccination coverage in children, adolescents, and adults. *Am J Prev Med* 2000;18:92-6.
- Vivier PM, Alario AJ, Peter G, Leddy T, Simon P, Mor V. An analysis of the immunization status of preschool children enrolled in a statewide Medicaid managed care program. *J Pediatr* 2001;139:624-9.
- Kempe A, Lowery NE, Pearson KA, Renfrew BL, Jones JS, Steiner JF, et al. Immunization recall: effectiveness and barriers to success in an urban teaching clinic. *J Pediatr* 2001;139:630-5.
- Klevens RM, Luman ET. US children living in and near poverty: risk of vaccine-preventable diseases. *Am J Prev Med* 2001;20:41-6.
- Santoli JM, Szilagyi PG, Rodewald LE. Barriers to immunization and missed opportunities. *Pediatr Ann* 1998;27:366-74.
- Udovic SL, Lieu TA. Evidence on office-based interventions to improve childhood immunization delivery. *Pediatr Ann* 1998;27:355-61.
- Szilagyi PG, Bordley WC, Vann JC, Chelminski A, Kraus RM, Margolis PA, et al. Effect of patient reminder/recall interventions improve immunization rates: a critical review of the literature. *JAMA* 2000;284:1820-7.
- Briss PA, Rodewald LE, Hinman AR, Shefer AM, Strikas RA, Bernier RR, et al. Reviews of evidence regarding interventions to improve vaccination coverage in children, adolescents, and adults. *Am J Prev Med* 2000;18:97-140.
- The National Vaccine Advisory Committee. Strategies to sustain success in childhood immunizations. *JAMA* 1999;282:363-70.
- Centers for Disease Control and Prevention. Recommendations of the Advisory Committee on Immunization Practices, the American Academy of Pediatrics, the American Academy of Family Physicians: use of reminder and recall by vaccination providers to increase vaccination rates. *MMWR Morb Mortal Wkly Rep* 1998;47:715-7.
- Stokley S, Maes E, Rodewald L. The impact of record scattering on the measurement of immunization coverage. *Pediatrics* 2001;107:91-6.
- Goldstein KP, Lauderdale DS, Glushak C, Walter J, Daum RS. Immunization outreach in an inner-city housing development: reminder-recall on foot. *Pediatrics* 1999;104:e69.
- Pierce C, Goldstein M, Suozzi K, Gallaher M, Dietz V, Stevenson J. Impact of the standards for pediatric immunization practices on vaccination coverage levels. *JAMA* 1996;276:626-30.
- Fairbrother G, Friedman S, DuMont K, Lobach K. Markers for primary care: missed opportunities to immunize and screen for lead and tuberculosis by private physicians serving large numbers of inner-city Medicaid-eligible children. *Pediatrics* 1996;97:785-90.
- Bordley W, Margolis P. The delivery of immunizations and other preventive services in private practices. *Pediatrics* 1996;97:467-73.
- Rodewald LE, Szilagyi PG, Humiston SG, Barth R, Kraus R, Raubertas RF. A randomized study of tracking with outreach and provider prompting to improve immunization coverage and primary care. *Pediatrics* 1999;103:31-8.
- Shefer A, Fritchley J, Stevenson J, et al. Linking WIC and immunization services to improve preventive health care among low-income children in WIC. *J Public Health Manage Pract* 2001. In press.

PEDIATRICS®

Increasing Immunization Coverage

Committee on Community Health Services and Committee on Practice and
Ambulatory Medicine

Pediatrics 2003;112:993-996

DOI: 10.1542/peds.112.4.993

This information is current as of April 18, 2005

The online version of this article, along with updated information and services, is
located on the World Wide Web at:

<http://www.pediatrics.org/cgi/content/full/112/4/993>

PEDIATRICS is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. PEDIATRICS is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 2004 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 0031-4005. Online ISSN: 1098-4275.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™



AMERICAN ACADEMY OF PEDIATRICS

POLICY STATEMENT

Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of All Children

Committee on Community Health Services and Committee on Practice and Ambulatory Medicine

Increasing Immunization Coverage

ABSTRACT. Despite many recent advances in vaccine delivery, the goal for universal immunization set in 1977 has not been reached. In 2001, only 77.2% of US toddlers 19 to 35 months of age had received their basic immunization series of 4 doses of diphtheria and tetanus toxoids and acellular pertussis (DTaP) vaccine, 3 doses of inactivated poliovirus vaccine, 1 dose of measles-mumps-rubella (MMR) vaccine, and 3 doses of *Haemophilus influenzae* type b (Hib) vaccine. Children who are members of a racial or ethnic minority, who are poor, or who live in inner-city or rural areas have lower immunization rates than do children in the general population. Additional challenges to vaccine delivery include the introduction of new childhood vaccines, ensuring a dependable supply of vaccines, bolstering public confidence in vaccine safety, and sufficient compensation for vaccine administration.

Recent research has demonstrated specific and practical changes physicians can make to improve their practices' effectiveness in immunizing children, including the following: 1) sending parent reminders for upcoming visits and recall notices; 2) using prompts during all office visits to remind parents and staff about immunizations needed at that visit; 3) repeatedly measuring practice-wide immunization rates over time as part of a quality improvement effort; and 4) having in place standing orders for registered nurses, physician assistants, and medical assistants to identify opportunities to administer vaccines. Pediatricians should work individually and collectively at local and national levels to ensure that all children receive all childhood immunizations on time. Pediatricians also can proactively communicate with parents to ensure they understand the overall safety and efficacy of vaccines.

ABBREVIATIONS. AAP, American Academy of Pediatrics; VFC, Vaccines for Children Program; VIS, vaccine information statements; DTaP, diphtheria and tetanus toxoids and acellular pertussis; MMR, measles-mumps-rubella; Hib, *Haemophilus influenzae* type b; ACIP, Advisory Committee on Immunization Practices; AAFP, American Academy of Family Physicians.

BACKGROUND INFORMATION

Disease prevention by immunization is a public health priority for both pediatricians and society as a whole. Comprehensive and timely immunization of young children has been a major goal of pediatric health care, as evidenced by the first American Academy of Pediatrics (AAP) pol-

icy statement on immunization in 1977, which called for universal childhood immunization.¹ The 1995 AAP policy statement "Implementation of the Immunization Policy" supported specific guidelines to improve the vaccine delivery system and increase immunization rates.² Many of the 1995 recommendations have been achieved, including the improvement of immunization financing through the Vaccines for Children (VFC) Program,³ production of parent-friendly vaccine information statements (VIS), promotion of the Standards for Child and Adolescent Immunization Practices,⁴ and development of safer and combined vaccines. Childhood immunization rates are one of the 10 leading health indicators used to assess the health of the nation as part of *Healthy People 2010*. The leading health indicators reflect the major health concerns in the United States.⁵

CHALLENGES

Despite recent advances in the vaccine delivery system, the goal for universal immunization set in 1977 has not been reached. In 2001, only 77.2% of US toddlers 19 to 35 months of age had received their basic immunization series of 4 doses of diphtheria and tetanus toxoids and acellular pertussis (DTaP) vaccine, 3 doses of inactivated poliovirus vaccine, 1 dose of measles-mumps-rubella (MMR) vaccine, and 3 doses of *Haemophilus influenzae* type b (Hib) vaccine (not including hepatitis B, hepatitis A, varicella, pneumococcal conjugate, or influenza vaccines).⁶ Therefore, almost one quarter of America's children lack at least 1 of the basic childhood immunizations. Furthermore, children who are members of a racial or ethnic minority, who are poor, or who live in inner-city or rural areas have lower immunization rates than do children in the general population.⁷

There have been and will continue to be challenges to the vaccine delivery system in terms of the science, economics, and social impact of immunization, and these challenges may increase as new vaccines are developed. New vaccines are on track to be introduced, and although they have the potential to improve the health of America's children, they may increase the burden on an already strained vaccine delivery system.⁸ Shortages of specific vaccines during 2001–2002 have brought to light the fragile nature of the US childhood vaccine supply and have resulted in significant disruption to childhood immunizations.

Another significant challenge to immunization delivery is the increasing concern within a segment of the general public about the safety and potential adverse effects of childhood immunizations. New organizations and Internet sites portraying themselves as official resources for credible information on vaccines continue to appear. Unfortunately, many provide flawed or biased information that serves to fuel public concern regarding the safety of childhood immunizations, leading to increased immunization refusal rates by families.⁹

NEW INFORMATION

Although these challenges seem daunting, opportunities exist to improve vaccine delivery and address these challenges in the future. With the implementation of the VFC Program and other changes in vaccine financing, there has been a dramatic shift in vaccine delivery away from public health clinics to primary care settings, which now administer 73% of all childhood vaccines, up from just 50% 10 years ago. Therefore, effective and timely administration of childhood vaccines rests with practicing pediatricians and other primary care clinicians. Recent research has demonstrated that physicians can take specific and practical steps to improve their practices' effectiveness in immunizing children.^{10,11} Similarly, applied research has identified approaches that can be used by health plans, public health departments, and state and federal government agencies to support improvements in the vaccine delivery system at the health care delivery and population levels.¹²

The Task Force on Community Preventive Services, convened by the US Department of Health and Human Services with support from the Centers for Disease Control and Prevention, analyzed the peer-reviewed published evidence on interventions designed to improve the timely immunization of children and adults.¹³ The task force found the following interventions to be proven effective for office practices to improve vaccine delivery (and the delivery of other preventive health care services):

- **Parent reminders for upcoming visits and recall notices** have increased immunization rates in many settings, such as private physician offices and public clinics; for children enrolled in health maintenance organizations; and for children from diverse backgrounds and economic groups, including urban and rural, and white, black, and Hispanic populations.
- **Nurse and/or physician reminders** in written or electronic form for vaccines needed during the visit have been shown to decrease missed opportunities to immunize during those visits.
- **Parent education and expanded access to services, such as after-hours or weekend clinics**, are effective when combined with other interventions to decrease missed opportunities for immunization during office visits.
- **Quality improvement efforts, including repeated measurement of immunization levels of an office practice's 1- and 2-year-old children**, allow clini-

cians to objectively assess their effectiveness in vaccine administration and evaluate the effectiveness of changes implemented to improve practice-wide immunization rates.

- **Standing orders for registered nurses, physician assistants, and medical assistants** that allow staff to independently screen patients, identify opportunities for immunization, and administer vaccines under physician supervision (where permissible by local regulations) are effective at raising immunization rates.¹⁴
- **Multicomponent interventions that include provider education were strongly recommended**, although their effectiveness needed further evaluation. Pediatricians can improve immunization quality and rates by combining clinical and staff education with other practice-wide system changes.

RECOMMENDATIONS

1. Pediatricians and child health professionals should join with the national AAP and AAP chapters in the following activities:
 - ◆ Vigorously advocating for all children to receive comprehensive health care, including childhood immunizations in a medical home.¹⁶ Children most likely to experience barriers to comprehensive care in a medical home are children who are members of racial and ethnic minorities, poor or uninsured children, children living in inner-city or rural areas, and children with chronic medical conditions.
 - ◆ Collaborating with local public and private child health services to identify children without access to a medical home and assist in referring them to a medical home. The medical home should maintain the children's medical records, including immunization records.
 - ◆ Removing economic barriers to immunizations for parents and pediatricians to participate in the VFC Program or state vaccine programs.
 - ◆ Reducing socioeconomic and racial disparities in immunization rates by working with all national medical groups and specialty societies that care for poor and underserved populations.
 - ◆ Advocating with state vaccine purchasing or VFC Programs and private third-party payers of vaccine for adequate vaccine reimbursement rates that cover all costs associated with the administration of vaccines, including the vaccines product, physician work, practice administrative expense, professional liability, and all related supplies, including safety needles.
 - ◆ Advocating with vaccine manufacturers and state and federal governments to maintain an adequate supply of all childhood vaccines at all times.
 - ◆ Ensuring that the safest and most effective vaccines and combinations are available to children.

- ◆ Advocating with state and federal governments to ensure that timely access to all immunizations recommended by the Advisory Committee on Immunization Practices (ACIP), the AAP, and the American Academy of Family Physicians (AAFP) for all children remains a high public policy priority.
 - ◆ Supporting ongoing education and quality improvement programs for pediatricians and other child health care professionals about important vaccine-related issues, including the dissemination of peer-reviewed evidence for more effective immunization delivery.
2. Pediatricians should undertake assessment and improvement activities necessary to maximize their practices' effectiveness in immunizing children.
 3. Pediatricians should use the most current vaccine information statements to educate parents about vaccine risks and benefits of immunizations (available on the AAP Web site at www.aap.org).
 4. As directed by the National Childhood Vaccine Injury Act,¹⁵ pediatricians should report all adverse events related to vaccines by using the Vaccine Adverse Event Reporting System (see <http://www.vaers.org/> for forms and instructions).
 5. Pediatricians should support and implement the Standards for Child and Adolescent Immunization Practices as endorsed by the AAP and the National Vaccine Advisory Committee (see <http://www.cdc.gov>).

COMMITTEE ON COMMUNITY HEALTH SERVICES,
2002–2003

Helen M. DuPlessis, MD, MPH, Chairperson
Wyndolyn C. Bell, MD
Suzanne C. Boulter, MD
Denice Cora-Bramble, MD
Charles Feild, MD, MPH
Gilbert A. Handal, MD
Murray L. Katcher, MD, PhD
Francis E. Rushton, Jr, MD
*David L. Wood, MD, MPH

Arthur Lavin, MD
Past Committee Member
Paul Melinkovich, MD
Past Committee Member

LIAISONS

Jose H. Belardo, MSW, MS
US Maternal and Child Health Bureau
Lance E. Rodewald, MD
Ambulatory Pediatric Association
Denia A. Varrasso, MD
Immunization Subcommittee, Chairperson

STAFF

Carmen A. Mejia, MA

COMMITTEE ON PRACTICE AND AMBULATORY
MEDICINE, 2002–2003

Kyle E. Yasuda, MD, Chairperson
Lawrence D. Hammer, MD
Norman R. Harbaugh, Jr, MD
Philip G. Itkin, MD
P. John Jakubec, MD

Robert D. Walker, MD
F. Lane France, MD
Past Committee Member
Thomas J. Herr, MD
Past Committee Member
Allan S. Lieberthal, MD
Past Committee Member
Jack Swanson, MD
Past Committee Member
Katherine Teets Grimm, MD
Past Committee Member

LIAISONS

Adrienne A. Bien
Medical Group Management Association
Todd Davis, MD
Ambulatory Pediatric Association
Winston S. Price, MD
National Medical Association

STAFF

Robert H. Sebring, PhD

*Lead author

REFERENCES

1. American Academy of Pediatrics, Committee on Standards of Child Health Care. AAP National Immunization Policy. *AAP News and Comment*. October 1977;28:7–8
2. American Academy of Pediatrics, Committee on Practice and Ambulatory Medicine. Implementation of the immunization policy. *Pediatrics*. 1995;96:360–361
3. Wood DL, Halfon N. The impact of the Vaccine for Children's Program on child immunization delivery. A policy analysis. *Arch Pediatr Adolesc Med*. 1996;150:577–581
4. Centers for Disease Control and Prevention. Recommendations of the Advisory Committee on Immunization Practices: programmatic strategies to increase vaccination coverage by age 2 years—linkage of vaccination and WIC services. *MMWR Morb Mortal Wkly Rep*. 1996;45:217–218
5. US Department of Health and Human Services. *Healthy People 2010: Understanding and Improving Health*. 2nd ed. Washington, DC: US Government Printing Office; 2000
6. Centers for Disease Control and Prevention. National, state, and urban area vaccination coverage levels among children aged 19–35 months—United States, 2001. *MMWR Morb Mortal Wkly Rep*. 2002;51:664–666
7. Institute of Medicine. *Calling the Shots: Immunization Finance Policies and Practices*. Washington, DC: National Academy Press; 2000
8. National Institutes of Health. *The Jordan Report 2000: Accelerated Development of Vaccines*. Washington, DC: National Institutes of Health, National Institute of Allergy and Infectious Disease; 2000. Available at: <http://www.niaid.nih.gov/publications/pdf/jordan.pdf>. Accessed January 1, 2003
9. Wolfe RM, Sharp LK, Lipsky MS. Content and design attributes of antivaccination Web sites. *JAMA*. 2002;287:3245–3248
10. Carlin E, Carlson R, Nordin J. Using continuous quality improvement tools to improve pediatrics immunization rates. *Jt Comm J Qual Improv*. 1996;22:277–288
11. Sinn JS, Morrow AL, Finch AB. Improving immunization rates in private pediatric practices through physician leadership. *Arch Pediatr Adolesc Med*. 1999;153:597–603
12. LeBaron CW, Chaney M, Baughman AL, et al. Impact of measurement and feedback on vaccination coverage in public clinics, 1988–1994. *JAMA*. 1997;277:631–635
13. Briss PA, Rodewald LE, Hinman AR, et al. Reviews of the evidence regarding interventions to improve vaccination coverage in children, adolescents, and adults. *Am J Prev Med*. 2000;18(1 suppl):97–140
14. Raddish M, Goldmann DA, Kaplan LC, Perrin JM. The immunization status of children with spina bifida. *Am J Dis Child*. 1993;147:849–853
15. National Childhood Vaccine Injury Act. Pub L No. 99-660 (1986)
16. American Academy of Pediatrics, Medical Home Initiatives for Children With Special Needs Project Advisory Committee. The medical home. *Pediatrics*. 2002;110:184–186
17. Santoli JM, Rodewald LE, Maes EF, Battaglia MP, Coronado VG. Vaccines for Children Program, United States, 1997. *Pediatrics*. 1999;104(2). Available at: <http://www.pediatrics.org/cgi/content/full/104/2/e15>

ADDITIONAL READINGS AND GENERAL REFERENCES

- American Academy of Pediatrics Childhood Immunization Support Program. Available at: <http://www.cisimmunize.org>. Accessed January 1, 2003
- National Immunization Program, Centers for Disease Control and Prevention. Available at: <http://www.cdc.gov/nip/>. Accessed January 1, 2003
- Standards for Child and Adolescent Immunization Practices. Available at: <http://www.cdc.gov/od/nvpo/standar.htm>. Accessed January 1, 2003
- Vaccines for Children Program. Available at: <http://www.cdc.gov/nip/vfc>. Accessed January 1, 2003
- National Immunization Information Network. Available at: <http://www.immunizationinfo.org>. Accessed January 1, 2003
- Vaccine Adverse Events Reporting System (VAERS). Available at: <http://www.vaers.org>. Accessed January 1, 2003
- Association of American Indian Physicians. Available at: <http://www.aaip.com>. Accessed January 1, 2003
- National Medical Association. Available at: <http://www.nmanet.org/>. Accessed January 1, 2003
- National Hispanic Medical Association. Available at: <http://home.earthlink.net/~nhma/>. Accessed January 1, 2003

All policy statements from the American Academy of Pediatrics automatically expire 5 years after publication unless reaffirmed, revised, or retired at or before that time.

Increasing Immunization Coverage
Committee on Community Health Services and Committee on Practice and
Ambulatory Medicine
Pediatrics 2003;112;993-996
DOI: 10.1542/peds.112.4.993

This information is current as of April 18, 2005

Updated Information & Services	including high-resolution figures, can be found at: http://www.pediatrics.org/cgi/content/full/112/4/993
References	This article cites 12 articles, 5 of which you can access for free at: http://www.pediatrics.org/cgi/content/full/112/4/993#BIBL
Citations	This article has been cited by 1 HighWire-hosted articles: http://www.pediatrics.org/cgi/content/full/112/4/993#otherarticles
Subspecialty Collections	This article, along with others on similar topics, appears in the following collection(s): Office Practice http://www.pediatrics.org/cgi/collection/office_practice
Permissions & Licensing	Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at: http://www.pediatrics.org/misc/Permissions.shtml
Reprints	Information about ordering reprints can be found online: http://www.pediatrics.org/misc/reprints.shtml

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™



PEDIATRICS®

Adoption of Reminder and Recall Messages for Immunizations by Pediatricians and Public Health Clinics

Cheryl D. Tierney, Hussain Yusuf, Shawn R. McMahon, Donna Rusinak, Megan A.
O' Brien, Mehran S. Massoudi and Tracy A. Lieu
Pediatrics 2003;112;1076-1082
DOI: 10.1542/peds.112.5.1076

This information is current as of April 18, 2005

The online version of this article, along with updated information and services, is
located on the World Wide Web at:

<http://www.pediatrics.org/cgi/content/full/112/5/1076>

PEDIATRICS is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. PEDIATRICS is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 2004 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 0031-4005. Online ISSN: 1098-4275.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™



Adoption of Reminder and Recall Messages for Immunizations by Pediatricians and Public Health Clinics

Cheryl D. Tierney, MD, MPH*; Hussain Yusuf, MBBS, MPH‡; Shawn R. McMahon, MD, MPH‡; Donna Rusinak, BS§; Megan A. O' Brien, MPH§; Mehran S. Massoudi, PhD, MPH‡; and Tracy A. Lieu, MD, MPH§||

ABSTRACT. *Objective.* Strong scientific evidence and national recommendations support the use of reminder and recall messages to improve immunization coverage rates, yet reports have suggested that only a minority of pediatric practices use such messages. Our aims were to 1) determine the proportions of pediatric practices and public clinics that currently use practice-based reminder or recall messages and routinely undergo immunization assessment efforts, 2) evaluate barriers and supports to implementing these practices, and 3) identify predictors of either current use or plans for future adoption of these practices.

Methods. This study combined qualitative and quantitative methods in sequential phases. In the qualitative phase, we conducted semistructured, open-ended interviews with a convenience sample of 18 clinician-administrators representing adopters and nonadopters of these messages in both private practices and public health clinics. In the subsequent quantitative phase, we mailed a structured, closed-ended survey to national samples of randomly selected pediatricians ($n = 600$) and public clinics ($n = 600$).

Results. Response rates were 75% for pediatricians and 77% for public clinics. Among pediatricians, 38% were conducting regular assessments of immunization coverage but only 16% were currently using routine reminder or recall messages. Among public clinics, 85% were conducting regular assessments and 51% were using reminder or recall messages. Among pediatricians' practices, the most commonly reported barriers to the adoption of reminder or recall messages were lack of time and funding and the inability to identify children at specified ages. For pediatricians' practices, the strongest predictors of current use of reminder or recall messages were having a champion who led efforts to improve immunization delivery (odds ratio: 1.85; 95% confidence interval: 1.08–3.18) and current use of regular immunization assessments (odds ratio: 2.30; 95% confidence interval: 1.33–3.84). Likewise, for public health clinics, having a champion to lead immunization improvement efforts and believing that their current system needed improve-

ment was associated with current use of reminder or recall messages.

Conclusions. Reminder and recall messages remain underused by both pediatricians and public health clinics. Promising strategies to promote adoption of these approaches in both the private and the public sectors include identifying and training champions to promote immunization delivery improvement efforts and helping practices develop methods to identify children at specific ages. *Pediatrics* 2003;112:1076–1082; *immunizations, interventions, quality of care, recall, reminder, assessment.*

ABBREVIATIONS. OR, odds ratio; CI, confidence interval.

Despite increases in immunization coverage rates over the past decade,¹ national coverage rates for several vaccines remain just below the Healthy People 2010 goals of 90% for each vaccine series among young children.^{2,3} Approximately 1 in 4 children aged 19 to 35 months has missed at least 1 recommended vaccine.²

Reminder and recall messages sent by mail or telephone have been found effective at increasing childhood immunization coverage rates in many settings,^{4,5} including private practices,⁴ academic centers,^{6,7} health maintenance organizations,^{8,9} and public health clinics.^{10–13} On the basis of this evidence, the Task Force on Community Preventive Services in 1999 strongly recommended that all practices implement these approaches.¹⁴ In addition, both the National Vaccine Advisory Committee^{15,16} and the Task Force on Community Preventive Services^{17,18} have recommended routine immunization audits to determine immunization coverage levels for preschool-age children in both the public¹⁹ and private²⁰ sectors.

Despite these recommendations and the compelling evidence of effectiveness, a 1995 survey indicated that only 35% of pediatricians and 23% of family physicians were using reminder or recall messages (R. Zimmerman, unpublished data). One study in an urban teaching clinic identified some barriers to implementing such messages.⁷ However, important gaps exist in our understanding of how frequently these barriers occur in varying health care delivery systems on a national basis.¹⁸ Policy makers need more specific information about these barriers, as well as the factors that have helped adopters of reminder or recall messages and assessment/feedback

From the *Harvard Combined Pediatric Health Services Research Fellowship Program, Boston, Massachusetts; ‡National Immunization Program, Centers for Disease Control and Prevention, Atlanta, Georgia; and §Center for Child Healthcare Studies, Department of Ambulatory Care and Prevention, Harvard Pilgrim Healthcare and Harvard Medical School, ||Division of General Pediatrics, Children's Hospital, Boston, Massachusetts.

Received for publication Oct 23, 2002; accepted Apr 24, 2003.

Reprint requests to (C.D.T.), Baystate Health System, High Street Health Center, 140 High St, Pediatrics, Springfield, MA 01199. E-mail: cheryl.tierney@bhs.org

PEDIATRICS (ISSN 0031 4005). Copyright © 2003 by the American Academy of Pediatrics.

systems overcome them. The perspectives of pediatricians are particularly important because >70% of children receive their vaccines from pediatricians²¹ and >80% receive vaccines in the private sector.²²

The aims of this study were to 1) determine the proportion of pediatric practices and public clinics that currently use practice-based reminder or recall messages and make regular immunization assessment efforts, 2) evaluate barriers and supports to implementing these practices, and 3) identify predictors of either current use or plans for future adoption of these approaches.

METHODS

Overview

This 2-phase study began with a qualitative phase in which we conducted semistructured interviews with key informants to identify appropriate issues and questions about catalysts and barriers to adopting reminder, recall, or assessment/feedback approaches. This was followed by a quantitative phase with a cross-sectional design in which we mailed a structured, closed-ended survey to national samples of immunization providers in the private and public sectors. The study was approved by the Human Studies Committee of Harvard Pilgrim Health Care and was classified exempt by the Institutional Review Board of the Centers for Disease Control and Prevention.

Qualitative Phase

We conducted semistructured interviews with a convenience sample of 18 clinician-administrators. We reviewed published literature and interviewed several experts in immunization delivery research to identify domains for the interview. The 8 domains were 1) current immunization practices, 2) messages to parents (reminders, recall messages, or other), 3) barriers to implementation of reminder or recall messaging, 4) assessment and feedback efforts for monitoring immunization coverage rates, 5) insurer and immunization reimbursement, 6) practice characteristics and demographics, 7) immunization registry participation, and 8) practice attitudes about immunizations. We then interviewed 10 adopters of reminder or recall messages (3 providers in private practice, 4 providers in public health clinics, 1 administrator in a health maintenance organization practice, and 2 administrators from insurance plans) and 8 nonadopters (3 in private practice, 2 in public health clinics, and 3 from insurance plans). Interviews were conducted to the point of theoretical saturation such that additional interviews yielded no new issues or themes related to our study questions. The interviews, which lasted 30 to 60 minutes, were conducted by at least 2 investigators (C.D.T., T.A.L., and/or D.L.R.) and were audiotaped. Interview notes and tapes were reviewed for common themes and areas of similarity and contrast between adopters and nonadopters of reminder and recall messages.

Quantitative Phase

Survey Development

Results of the qualitative phase were used to identify content areas and questions for the national surveys. The 21-item survey covered 5 domains: 1) messages to parents (reminders, recall messages, or other), 2) barriers to implementation of reminder or recall messaging systems, 3) other immunization practices (eg, assessment/feedback efforts, immunization registry participation), 4) practice attitudes about immunizations, and 5) practice characteristics and demographics.

Routine use of immunization assessments was defined as measuring immunization coverage rates at least every 2 years. Use of a reminder system was defined as routinely sending messages by either telephone or mail to parents of children at preselected ages (eg, all 24-month-olds) to remind them of an upcoming immunization or well visit, regardless of whether the child had an appointment scheduled. Use of a recall message system was defined as routinely sending messages to parents of children at preselected ages to notify them of a past-due immunization or well visit. In our survey, we defined these messaging protocols as having a

“practice-based” system. The survey asked whether the group had an individual who led efforts to improve immunization delivery, which we defined as an immunization “champion.”

Data Collection

The surveys were mailed to 2 subgroups: a random sample of 600 pediatricians from the American Medical Association master file and a random sample of 600 public health clinic providers from the National Association of City and Community Health Officers database. Two waves of surveys were mailed in winter 2001. The first mailing included a pen as a thank-you gift. An error by the mail house that conducted the first mailing resulted in our not being able to track surveys to separate responders from non-responders. The second mailing was sent to each person in the original sample, with a cover letter asking them to ignore the request if they had already completed the survey. In the pediatrician subgroup, results include the responses to both waves. However, in the public health clinic subgroup, the responses to both waves combined yielded a response rate of >100%. To avoid the problem of duplicate surveys for public health clinics, we included only the responses from the first wave in analyses.

Statistical Methods

Response rates were calculated using the method described by the American Association for Public Opinion Research.²³ Bivariate analyses included the χ^2 test, the Wilcoxon rank-sum test, and the Spearman correlation coefficient. Multivariate analyses were conducted using logistic regression for dichotomous outcomes and linear regression for ordinal outcomes. Predictors that were significant at $P < .20$ in bivariate analyses were included in multivariate models. We used an iterative, forced-entry approach, entering variables in successive models and removing variables when a correlation matrix suggested that they were highly correlated with other variables in the model.

RESULTS

Qualitative Findings

As Table 1 shows, both adopters and nonadopters of reminder or recall messages identified time and money as the most important barriers to implementing these methods. However, several areas of contrast suggest how adopters overcame these barriers. Adopters were more likely than nonadopters to identify immunization delivery as a responsibility of the health care system, rather than the responsibility of the parent or the individual provider alone. Adopters were also more likely to identify immunization delivery as a top priority and to have a single person who led improvement efforts. In addition, several adopters identified an immunization registry or feedback to staff about successes and problems in immunization efforts as an important factor.

Quantitative Findings

Study Populations

Of the 600 surveys mailed to pediatricians, 447 were returned and 434 (97% of 447) were eligible. The response rate among pediatricians was 75% (434 completed surveys/estimated 582 eligible). Of the 600 surveys mailed to public health clinics, 459 were returned and 440 (96% of 459) were eligible. The public health clinic response rate was 77% (440 completed/estimated 575 eligible).

In the pediatrician sample (Table 2), the most common types of practice were solo or 2-physician practices (32%) and single-specialty groups (44%). The majority of pediatricians in the study population (55%) were in suburban settings, and 52% had < 20%

TABLE 1. Similarities and Contrasts Between Adopters and Nonadopters of Reminder or Recall Messages, From Qualitative Interviews With Private Practices and Public Health Clinics

	Adopters	Nonadopters
Private practices (barriers: time and money were/are the greatest barriers, but adopters found ways to overcome this [grants provided]; other barriers: information technology support, staff buy-in, staff computer skills)		
Areas of similarity	Top priority for practice Needs leader to be successful Report success to practice to maintain motivation	Not in top 5 priorities
Areas of contrast	View underimmunization as a system problem, not an individual provider problem Measured immunization coverage rates, found problems, and implemented messages to improve coverage View duplication of work as a problem: immunizations logged into computer and written in chart	Most had access to computer systems that could track data or produce lists if desired Rely on patients to seek immunizations proactively Had previous reports of good immunization rates, or were not interested in measuring rates Registry participation is variable to low
Public health clinics (top priority; need computer support; time and money important barriers)		
Areas of similarity	Grant provided to help with costs of startup Feedback to staff is important Accountability to state is important	Reporting: state has not measured rates Not currently participating in immunization registry
Areas of Contrast	Key to success is staff buy-in and leader to own the initiative Funding for clinic tied to performance measures Registry with a report function is helpful Immunization drives the activities in the clinic	

Medicaid patients. In contrast, most public health clinics in the study population (66%) were in rural settings and most had >20% Medicaid patients (77%).

Use of Assessments and Reminder or Recall Messages

Among pediatricians, 37% were currently using assessments and 16% were using practice-based reminder messages, recall messages, or both (Table 3). Thirty-one percent of the pediatricians agreed with the statement that their practice was likely to adopt a new system to send reminder or recall messages during the next year. Public health clinics were more likely than pediatricians to be currently using assessments (85%) or reminder and/or recall messages (51%).

Barriers to Adopting Reminder or Recall Messages

The patterns of identified barriers to adopting reminder or recall messages were similar between adopters and nonadopters of these practices (Table 4). Both adopters and nonadopters most commonly named lack of time and funding as barriers to adoption. In the pediatrician group, the next most commonly named barrier (29% of adopters and 35% of nonadopters) was not having a simple way of identifying children at a specific age. Lack of knowledge about how to get started and limited computer skills were named as barriers by only 10% to 18% of respondents in any subgroup.

Factors Associated With Adoption of Reminder or Recall Messages by Pediatricians' Practices

In bivariate analyses, the current use of reminder or recall messages by pediatricians' practices was associated with having a key person (hereafter referred to as a champion) who led efforts to improve immunization delivery, use of immunization assessments, type of practice, and percentage of patients insured by Medicaid (Table 5). The immunization champions in pediatric practices were mostly physicians or nurse practitioners (57%) and less often nurse managers or nurses (32%). In contrast, champions in public health clinics were mostly nurse managers or nurses (90%). Solo and 2-physician practices (21%) were much more likely to be using reminder or recall messages than single-specialty groups (10%) or multispecialty groups (14%; $P < .001$).

In the final multivariate model, we removed type of practice because it was highly correlated with other potential predictors. In the final model, current use of assessments (odds ratio [OR]: 2.30; 95% confidence interval [CI]: 1.33–3.84) and having a champion (OR: 1.85; 95% CI: 1.08–3.18) were the variables most highly associated with current use of reminder or recall messages.

We also conducted bivariate and multivariate analyses to identify predictors of agreement with the statement, "During the next year, our practice is

TABLE 2. Characteristics of Respondents in the Two Study Groups

Characteristic	Pediatricians (n = 434)		Public Health Clinics (n = 440)	
	n	%	n	%
Type of practice				
Solo or 2-physician practice	139	32	—	—
Single specialty group	191	44	—	—
Multispecialty group	71	17	—	—
Other*	29	7	—	—
No. of advanced practice clinicians at site†				
0	0	0	83	21
1–5	250	58	300	74
6–20	132	31	16	4
>20	48	11	5	1
No. of nurses at site‡				
0	NA	NA	295	67
1–5	NA	NA	85	19
6–20	NA	NA	41	9
>20	NA	NA	17	4
Setting				
Urban	118	28	80	19
Suburban	236	55	67	16
Rural	74	17	286	66
% of patients insured by Medicaid				
<20%	222	52	100	23
20%–<50%	141	33	172	40
50%–<80%	51	12	135	31
80%–100%	16	4	28	6

NA indicates not applicable.

* In the pediatrician subgroup, the “other” category included 13 respondents from staff or group-model health maintenance organizations, 3 from hospital-based practices, 6 from community health centers, 3 from public health clinics, and 4 from other types of practices. In the public health clinic subgroup, 92% of respondents were public health clinics, 1% were hospital-based practices, 4% were community health centers, and 3% were other types of practices.

† Clinicians included physicians, nurse practitioners, and physician assistants.

‡ Did not collect this information for private sector.

TABLE 3. Proportions of Pediatricians and Public Health Clinics With Current Use or Future Plans to Use Immunization Assessments, Reminder or Recall Messages

Immunization Practice	Pediatricians (n = 433)	Public Health Clinics (n = 439)
	(n [%])	(n [%])
Currently making assessment efforts	162 (37)	371 (85)
Planning to start assessment efforts during the next year*	85 (20)	29 (7)
Currently using message systems for immunizations		
Reminders only	37 (8)	74 (17)
Recalls only	18 (4)	85 (19)
Reminders and recalls	16 (4)	64 (15)
Reminders, recalls or both	71 (16)	223 (51)
Planning to adopt a new system to send reminders or recalls for immunizations during the next year†	105 (24)	80 (18)

* Number of respondents reporting plans to start routinely measuring immunization rates during the next year, among those who were not currently conducting routine assessments (by self-report on 2 questions; n = 241 pediatricians and n = 50 public health clinics).

† Number of respondents reporting plans to adopt a new system for reminder or recall messages during the next year, among those who were not currently using such messages (by self-report on several questions; n = 343 pediatricians and n = 146 public health clinics).

likely to adopt a new system that involves sending messages to improve immunization delivery.” In the final linear regression model, pediatricians were more likely to report plans for future adoption of recall or reminder messages when they had a champion who led efforts to improve immunization delivery ($P < .03$), when they conducted routine assessments for immunization coverage ($P < .05$), when they believed that their current immunization deliv-

ery system needed improvement ($P < .001$), and when >20% of their patients were Medicaid insured ($P < .007$). In addition, they were less likely to report plans to adopt a new system when they already had a computerized billing system ($P < .004$), when they received immunization delinquency reports or lists from an outside source ($P < .02$), or when they practiced in urban or suburban rather than rural settings ($P < .005$).

TABLE 4. Barriers to Adoption of Reminder or Recall Messages Most Frequently Cited by Adopters Versus Nonadopters*

Barrier	% in This Subgroup Citing This Factor as a Barrier			
	Pediatricians		Public Health Clinics	
	Adopters (<i>n</i> = 59)	Nonadopters (<i>n</i> = 371)	Adopters (<i>n</i> = 170)	Nonadopters (<i>n</i> = 266)
Lack of time to lead this type of effort	34	55	26	46
Lack of time to review records routinely	41	52	38	27
Lack of start-up funding	29	56	29	61
Lack of maintenance funding	27	50	31	57
No simple way of identifying children at a specific age	29	35	17	38
No simple way to determine who needs messages	19	33	8	25
Limited computer skills of office staff	14	11	18	11
Lack of knowledge on how to get started	10	21	4	18
Other	14	11	17	16

* Adopters were asked, "What were the barriers encountered when adopting your reminder or recall system?" Nonadopters were asked, "What barriers would you anticipate if you were to adopt a reminder or recall system?"

TABLE 5. Predictors of Current Use of Reminder or Recall Messages by Pediatricians' Practices*

Predictor	<i>N</i> in this Subgroup	% in This Subgroup Currently Using Reminder or Recall Messages	Bivariate Analysis	Multivariate Analysis	
			<i>P</i> *	OR	95% CI
Current use of immunization assessments			.001		
Yes	162	23		2.30	1.33–3.84
No	269	12		Referent	...
Practice has key person who leads efforts to improve immunization delivery†			.0061*		
Yes	213	22		1.85	1.08–3.18
No	218	11		Referent	...
Type of practice			.0002	NS	
Solo or 2-physician practice	139	21			
Single-specialty group	191	10			
Multispecialty group	71	14			
Other‡	29	41			
% Medicaid patients			.03	NS	
<20%	222	13			
20%–<50%	141	19			
50%–<80%	51	27			
80%–100%	16	6			

NS indicates not significant.

* Other variables that were evaluated and found not to be significant in bivariate analyses were having an immunization summary page as part of the medical record; having a computerized medical record, appointment, or billing system; participating in a local or regional immunization registry; believing that the practice's patients are at high risk for missing an immunization or acquiring a vaccine-preventable disease; believing that the practice's current immunization delivery system does not need improvement; receiving immunization reports or lists from an outside source such as a health plan or a state agency; estimated immunization coverage rate among 2-year-olds; number of clinicians at the practice site; and practice setting.

† *P* value is from Fisher exact test.

‡ The "other" group includes staff or group model health maintenance organizations, hospital-based practices, and community health centers.

Other Findings

We conducted multivariate analyses to identify predictors of 1) current use of reminder or recall messages by public health clinics, 2) current use of assessments by pediatricians and public health clinics, and 3) future plans by pediatricians to implement routine immunization coverage assessments. Current use of reminder or recall messages by public health clinics was associated with having a champion who led efforts to improve immunization delivery (OR: 3.01; 95% CI: 1.34–6.73) and believing that the current immunization delivery system needed improvement (OR: 1.70; 95% CI: 1.29–2.24).

Current use of assessments by pediatricians' practices was associated with having a champion who led efforts to improve immunization delivery (OR: 1.38; 95% CI: 0.89–2.13) and participating in a local or

statewide immunization registry (OR: 1.85; 95% CI: 1.20–2.85). Current use of assessments by public health clinics was associated with participation in a local or statewide immunization registry (OR: 1.75; 95% CI: 1.00–3.07). Private providers were more likely to report plans to implement immunization assessment efforts in the next year when they had a champion who leads efforts to improve immunization delivery ($P < .002$), believed that the current immunization delivery system needs improvement ($P < .008$), or did not have a computerized billing system ($P < .03$).

DISCUSSION

Major Findings

This study suggests that fewer than 1 in 5 pediatric or multispecialty group practices are currently using

immunization reminder or recall messages. Practices in which a champion was leading efforts to improve immunizations or that conduct routine assessments of immunization coverage were approximately twice as likely to be using reminder or recall messages as other practices. These factors were also highly associated with the reported likelihood of adopting a new reminder or recall system during the next year.

Both adopters and nonadopters of immunization reminder or recall messages named lack of time and funding as the most important barriers to implementing such methods. The qualitative phase of our study found that adopters had used many different methods to overcome these barriers, including eliciting staff interest through feedback reports and participation in local or state immunization registries. The qualitative interviews also suggested that adoption of reminder or recall messages is associated with the perception that immunization delivery is a responsibility of the health care system, rather than of the parent or the individual provider alone.

Interpretation and Context

In the national survey, having a champion to lead efforts to improve immunization delivery was strongly and independently associated with both current use of reminder or recall efforts and plans to initiate assessments of immunization coverage rates in the next year. This finding is aligned with ideas described by Rogers in the book *Diffusion of Innovations*.²⁴ Rogers suggested that opinion leaders, who are respected and influential in the community, play an important role in the adoption of new practices. Experts in clinical practice improvement believe that it is possible to identify people who are predisposed to be champions and to enable and reinforce their work (Dennis Ross-Degnan, ScD, personal communication).

These results suggest that it may be useful to try to identify and train champions to promote the adoption of reminder or recall messages in their own practices or clinics. It may also be possible to have such champions act as opinion leaders to promote the adoption of immunization assessment and message systems by other practice groups. The use of peers as opinion leaders to disseminate clinical practice changes has succeeded in several other health care delivery issues, including the management of acute myocardial infarction.^{25,26}

The lack of a simple way to identify children at a specific age was a barrier cited by more than one third of the respondents to the national survey. The adoption of reminder messages might be enhanced by helping practices to develop strategies for identifying children at specific ages using either manual systems or computer programs linked with billing systems. Most pediatricians (83%) reported having a computerized billing system. We were surprised by the finding that practices with computerized billing systems were actually less likely than those without to report plans to adopt a new reminder or recall messaging system within the next year. It is possible that existing computerized billing systems may actually impede adoption of new practices as a result of

either true technologic limitations or the perception that they would be difficult to adapt for use in messaging.

Participation in immunization registries was associated with immunization assessment efforts in both the pediatrician and public health clinic subgroups. Assessment efforts alone may be an effective strategy for improving immunization rates,²⁷ and in the current study, they were associated with the current use of reminder or recall messages.

Limitations

One strength of this study is the use of both qualitative and quantitative methods that enabled us to describe barriers and supports from the perspectives of both specific practices and the national population. In the national survey, the response rates were relatively high compared with other studies of health care providers. However, because survey respondents tend to give socially acceptable answers, our results may overestimate the true rates of use of reminder or recall and assessment practices. In addition, the cross-sectional design of this study enabled us to identify associations but precludes making causal inferences between predictors and immunization practices.

Policy Implications

Recall and reminder messages remain underused by both pediatricians and public health clinics. Encouraging pediatric practices to adopt these approaches is particularly important because most US children receive their vaccines from private sector providers. For both pediatricians and public health clinics, adopting these practices will require overcoming limits on time, funding, and practices' inability to identify children at specific age groups. Promising strategies to promote adoption of these practices include encouraging use and expansion of immunization registries, recruiting and training champions to promote immunization delivery improvement efforts, and helping practices to develop methods to identify children at specific ages.

ACKNOWLEDGMENTS

This study was supported by the Centers for Disease Control and Prevention via the American Association of Health Plans (contract 0957-053). Dr Tierney's work was supported by a grant (T32 HP10018) from the Health Resources and Services Administration, Department of Health and Human Services, to the Harvard Pediatric Health Services Research Fellowship Program.

We gratefully acknowledge the contributions of the many clinicians and administrators who contributed to the qualitative interviews and the national survey. We appreciate the advice of Henry Bernstein, DO, James Cooley, MD, Gary Freed, MD, Victoria Freeman, DrPH, Peter Margolis, MD, Lance Rodewald, MD, Stacie Smith, MPH, and Richard Wasserman, MD, during the study's planning stages. We thank Tungela Grayson of the American Association of Health Plans and Deborah Mercy of the Centers for Disease Control and Prevention for administrative guidance and Charlene Gay for excellent assistance with manuscript preparation.

REFERENCES

1. National Immunization Program. Immunization coverage in the U.S. Available at: <http://www.cdc.gov/nip/coverage/#NIS>. Accessed June 1, 2002

2. Centers for Disease Control and Prevention. National, state, and urban area vaccination coverage levels among children aged 19–35 months—United States, 2001. *MMWR Morb Mortal Wkly Rep.* 2002;51:664–665
3. US Department of Health and Human Services. With understanding and improving health and objectives for improving health. In: *Healthy People 2010*. Washington, DC: US Government Printing Office; 2000:14-35–14-37
4. Szilagyi PG. Effect of patient reminder/recall interventions on immunization rates: a review. *JAMA.* 2000;284:1820–1827
5. Shefer A, Briss PA, Rodewald L. Improving immunization coverage rates: an evidence-based review of the literature. *Epidemiol Rev.* 1999;21:96–142
6. Oeffinger KC. The effect of patient education on pediatric immunization rates. *J Fam Pract.* 1992;35:288–293
7. Kempe A. Immunization recall: effectiveness and barriers to success in an urban teaching clinic. *J Pediatr.* 2001;139:630–635
8. Lieu TA, Black SB, Ray P. Computer-generated recall letters for under-immunized children: how cost-effective? *Pediatr Infect Dis J.* 1997;16:28–33
9. Lieu TA, Capra AM, Makol J, et al. Effectiveness and cost-effectiveness of letters, automated telephone messages, or both for underimmunized children in a health maintenance organization. *Pediatrics.* 1998;101(4). Available at: <http://www.pediatrics.org/cgi/content/full/101/4/E3>
10. Dietz VJ, Baughman AL, Dini EF, et al. Vaccination practices, policies, and management factors associated with high vaccination coverage levels in Georgia public clinics. *Arch Pediatr Adolesc Med.* 2000;154:184–189
11. Dini EF, Linkins RW, Chaney M. Effectiveness of computer-generated telephone messages in increasing clinic visits. *Arch Pediatr Adolesc Med.* 1995;149:902–905
12. Pierce C, Goldstein M, Suozzi K, et al. The impact of the standards for pediatric immunization practices on vaccination coverage levels. *JAMA.* 1996;276:626–630
13. Stehr-Green PA, Dini EF, Lindegren ML, Patriarca PA. Evaluation of telephoned computer-generated reminders to improve immunization coverage at inner-city clinics. *Am J Public Health.* 1993;108:426–430
14. Centers for Disease Control and Prevention. Vaccine preventable diseases: improving vaccination coverage in children, adolescents, and adults. A report of the recommendations of the Task Force on Community Preventive Services. *MMWR Morb Mortal Wkly Rep.* 1999;48:1–15
15. Centers for Disease Control and Prevention. Standards for pediatric immunization practices. *MMWR Morb Mortal Wkly Rep.* 1993;42:1
16. Centers for Disease Control and Prevention. Notice to readers: recommendations of the Advisory Committee on Immunization Practices, the American Academy of Pediatrics, and the American Academy of Family Physicians: use of reminder and recall by vaccination providers to increase vaccination rates. *MMWR Morb Mortal Wkly Rep.* 1998;47:715–717
17. Morey SS. Task force outlines ways to improve vaccination coverage. *Am Fam Physician.* 1999;60:2431–2432
18. Task Force on Community Preventive Services. Recommendations regarding interventions to improve vaccination coverage in children, adolescents, and adults. *Am J Prev Med.* 2000;18:92–96
19. LeBaron CW, Chaney M, Baughman AL, et al. Impact of measurement and feedback on vaccination coverage in public clinics, 1988–1994. *JAMA.* 1997;277:631–635
20. Massoudi MS, Walsh JA, Stokley S, et al. Assessing immunization performance of private practitioners in Maine: impact of the assessment, feedback, incentives, and exchange strategy. *Pediatrics.* 1999;103:1218–1223
21. Santoli JM, Rodewald L, Maes EF, et al. Vaccines for Children program, United States, 1997. *Pediatrics.* 1999;104(2). Available at: <http://www.pediatrics.org/cgi/content/full/104/2/e15>
22. LeBaron CW, Lyons B, Massoudi MS, Stevenson J. Childhood vaccination providers in the United States. *Am J Public Health.* 2002;92:266–270
23. The American Association for Public Opinion Research. *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys*. Ann Arbor, MI: AAPOR; 2000
24. Rogers E. *Diffusion of Innovations*. New York, NY: Simon & Schuster; 1995
25. Thompson O'Brien MA, Oxman AD, Haynes RB, Davis DA, Freemantle N, Harvey EL. Local opinion leaders: effects on professional practice and health care outcomes. *Cochrane Database Syst Rev.* 2000;2:CD000125
26. Soumerai SB, McLaughlin TJ, Gurwitz JH, et al. Effect of local medical opinion leaders on quality of care for acute myocardial infarction: a randomized controlled trial. *JAMA.* 1998;279:1358–1363
27. Bordley WC, Chelminski A, Margolis PA, et al. The effect of audit and feedback on immunization delivery: a systematic review. *Am J Prev Med.* 2000;18:343–350

BETTER THAN WELL

“Over the past half-century, American doctors have begun to use the tools of medicine not merely to make sick people better, but to make well people better than well. Bioethicists call these tools ‘enhancement technologies,’ and usually characterize them as ‘cosmetic’ technologies or ‘lifestyle’ drugs. But terms such as ‘enhancement’ can be misleading, and not just because most enhancements can also be accurately described as treatments for psychological injuries or illnesses. They are misleading because the people who use the technologies often characterize them not merely as a means of shaping identities. These are tools for working on the self.”

Elliott C. American bioscience meets the american dream. *American Prospect*. June 1, 2003

Submitted by Student

Adoption of Reminder and Recall Messages for Immunizations by Pediatricians and Public Health Clinics

Cheryl D. Tierney, Hussain Yusuf, Shawn R. McMahon, Donna Rusinak, Megan A. O' Brien, Mehran S. Massoudi and Tracy A. Lieu
Pediatrics 2003;112;1076-1082
DOI: 10.1542/peds.112.5.1076

This information is current as of April 18, 2005

Updated Information & Services	including high-resolution figures, can be found at: http://www.pediatrics.org/cgi/content/full/112/5/1076
References	This article cites 21 articles, 8 of which you can access for free at: http://www.pediatrics.org/cgi/content/full/112/5/1076#BIBL
Citations	This article has been cited by 1 HighWire-hosted articles: http://www.pediatrics.org/cgi/content/full/112/5/1076#otherarticles
Subspecialty Collections	This article, along with others on similar topics, appears in the following collection(s): Infectious Disease & Immunity http://www.pediatrics.org/cgi/collection/infectious_disease
Permissions & Licensing	Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at: http://www.pediatrics.org/misc/Permissions.shtml
Reprints	Information about ordering reprints can be found online: http://www.pediatrics.org/misc/reprints.shtml

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™



Suggestions to Improve Your Immunization Services



Following are several ideas that healthcare professionals and practices can use to improve their efficiency in administering vaccines and increase their immunization rates. Read each idea and check the response that applies to your work setting.

- Yes = We already practice this.
 No = We don't like this idea, or it couldn't work in our practice setting.
 Partly = We do some of this (or do it sometimes); we will consider it.

	Yes	No	Partly		Yes	No	Partly
1. In all exam rooms, we post the current, official U.S. immunization schedule for children and/or adults or variations thereof (for example, the official schedule of a medical society or of a state health department).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9. Prior to patient visits, we review the immunization record for each patient and flag charts of those who are due or overdue.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. We use the official "catch-up" schedule for children for advice on how to bring children up to date on their vaccinations when they have fallen behind.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	10. We provide vaccinations during some evening and/or weekend hours.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. We are familiar with special vaccination recommendations for high-risk patients (e.g., special groups who need hepatitis A, hepatitis B, pneumococcal, influenza vaccines).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	11. Patients can walk in during office hours for a "nurse only" visit and get vaccinated.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. When scheduling appointments, we remind patients/parents to bring along their (or their child's) personal shot record. We also confirm the address and phone number in case we need to contact them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	12. We use all patient encounters (including acute-care and follow-up visits) to assess and provide vaccinations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. We've trained our nursing and office staff (e.g., receptionist, scheduler) to know how to determine valid and invalid contraindications to vaccinations, as well as the minimum intervals permissible between vaccinations. This training ensures that our clinic staff miss no opportunity to vaccinate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	13. Whenever a patient comes in, the staff routinely asks to see his/her shot record to determine if the patient received vaccinations at another healthcare site.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Our staff are trained to administer multiple vaccinations to patients who are due for multiple vaccinations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	14. If a patient tells us "I'm up to date with my vaccinations," or "my child's vaccinations are up to date," we are not convinced. We must have written documentation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Our nurses can give vaccinations under standing orders (i.e., they can independently screen patients and administer vaccines under pre-existing signed physician's orders).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	15. We ask patients/parents to complete a simple screening questionnaire for contraindications to determine if the vaccinations they need can be given safely on the day of their visit. To save time, we have them complete it prior to seeing the clinician (e.g., in the waiting room).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. We maintain a comprehensive immunization record in a visible location in each patient's chart (e.g., the front of the chart).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	16. Before the clinician sees the patient, a staff member completes an immunization assessment and gives Vaccine Information Statements (VISs) to the patient/parent to read. If they need a VIS in another language, we give it, if it is available.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
				17. We can call on translators when we need to communicate with patients who speak little or no English.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(continued on next page)

	Yes	No	Partly		Yes	No	Partly
18. If children in our waiting room are the siblings or children of the patient, we pull their charts and review their immunization status and vaccinate them if needed before they leave the office.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	26. When giving vaccinations, we inform the patient/parent when the next appointment for vaccinations is due. We schedule the visit before they leave the office if our appointment system allows it; otherwise we put the information in a manual tickler system or electronic recall system.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19. If no immunization record exists for a patient at the time of the visit and we are unable to obtain records by phone, we give the vaccinations that we THINK are indicated, based on the history provided by the patient/parent. We have the patient/parent sign a release of records to obtain immunization records from previous providers. If no records of previous vaccinations can be located, the patient is treated as if unimmunized.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	27. If children miss "well-child" visits and can't be rescheduled quickly, we reschedule them in one to two weeks for a "shots only" visit.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20. With each patient visit, we document on the patient's chart that their immunization status has been reviewed (e.g., a notation such as "immunization status reviewed" is pre-printed on the progress note or other chart form).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	28. We contact all patients who are due for vaccinations with a reminder (e.g., by phone or mail) and those who are past due with a recall (e.g., using computerized tracking or a simple tickler system).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21. We give patients/parents a simple schedule of recommended vaccinations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	29. If we have written confirmation that a patient received vaccines at another site or at a public health, school-based, worksite-based, or community-based immunization site, we update the patient's medical chart with that information, recording the vaccination date(s) and healthcare site(s) where the vaccination was received.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22. We give patients/parents an information sheet about how to treat pain and fever following vaccinations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	30. We routinely assess immunization levels of our patient population, including those with high-risk indicators. (Contact your state or local health department's immunization staff for assistance in performing such an assessment.) We share this information with all our staff and use it to develop strategies to improve immunization rates.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23. We always update the patient's personal immunization record card each time we administer vaccinations. If the patient doesn't have a card, we give them one that contains their vaccination history.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	31. We are enrolled in the Vaccines for Children (VFC) program so that we can provide free vaccine to uninsured children (0-18 years) and others who are eligible under the state's program.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24. We provide resources (e.g., information, pamphlets, websites, hotline numbers) to patients/parents who have questions or concerns about vaccine safety or who want more vaccine information. We provide translated materials, if available.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
25. If we see a patient in our office and don't administer a vaccination when it's due, we document the reason why in the patient's chart.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				

Now that you know where you stand on your office practices, you can take steps that will likely improve your immunization rates. Talk to your local or state health department for assistance or visit the website of the Immunization Action Coalition at www.immunize.org/izpractices for resources to help you change your "partly" statements into "yes" statements.

Reference List

Studies on Effectiveness of Strategies

- Black ME, Ploeg J, Walter SD, et al. The impact of a public health nurse intervention on influenza vaccine acceptance. *American Journal of Public Health* 1993;83:1751-3.
- Bloom HG, Bloom JS, Krasnoff L, Frank AD. Increased utilization of influenza and pneumococcal vaccines in an elderly hospitalized population. *Journal of the American Geriatrics Society* 1988;36:897-901.
- Brimberry R. Vaccination of high-risk patients for influenza. A comparison of telephone and mail reminder methods. *Journal of Family Practice* 1988;26:397-400.
- Briss, PA, et al. Reviews of evidence regarding interventions to improve vaccination coverage in children, adolescents, and adults. *American Journal of Preventive Medicine* 2000;18(1s):97-140.
- Buffington J, Bell KM, LaForce FM. A target-based model for increasing influenza immunizations in private practice. Genesee Hospital Medical Staff. *Journal of General Internal Medicine* 1991;6:204-209.
- Cates CJ. A handout about tetanus immunization: influence on immunization rate in general practice. *British Medical Journal* 1990;300:789-90.
- Centers for Disease Control and Prevention. Use of standing orders programs to increase adult vaccination rates. Recommendations of the Advisory Committee on Immunization Practices. *Morbidity and Mortality Weekly Report* 2000;49(RR01):15-26.
- Crouse BJ, Nichol K, Peterson DC, Grimm MB. Hospital-based strategies for improving influenza vaccination rates. *Journal of Family Practice* 1994;38:258-261.
- Davidson RA, Fletcher SW, Retchin S, Duh S. A nurse-initiated reminder system for the periodic health examination. Implementation and evaluation. *Archives of Internal Medicine* 1984;144:2167-2170.
- Dickey LL, Petitti D. A patient-held minirecord to promote adult preventive care. *Journal of Family Practice* 1992;34:457-63.
- Hutchison BG, Shannon HS. Effect of repeated annual reminder letters on influenza immunization among elderly patients. *Journal of Family Practice* 1991;33:187-9.
- Lukasik MH, Pratt G. The telephone: an overlooked technology for prevention in family medicine. *Canadian Family Physician* 1987;33:1997-2001.
- Klein RS, Adachi N. An effective hospital-based pneumococcal immunization program. *Archives of Internal Medicine* 1986;146:327-9.
- Kouides RW, Lewis B, Bennett NM, et al. A performance-based incentive program for influenza immunization in the elderly. *American Journal of Preventive Medicine* 1993;9:250-255.
- Margolis KL, Lofgren RP, Korn JE. Organizational strategies to improve influenza vaccine delivery. *Archives of Internal Medicine* 1988;148:2205-2207.

- McDowell I, Newell C, Rosser W. Comparison of three methods of recalling patients for influenza vaccination. *Canadian Medical Association Journal* 1986;135:991-997.
- Nichol KL. Improving influenza vaccination rates for high-risk inpatients. *American Journal of Medicine* 1991;91:584-8.
- Nicholson KG, Wiselka MJ, May A. Influenza vaccination of the elderly: perceptions and policies of general practitioners and outcome of the 1985-86 immunization programme in Trent, UK. *Vaccine* 1987;5:302-6.
- Patriarca PA, Weber JA, Meissner MK, et al. Use of influenza vaccine in nursing homes. *Journal of the American Geriatrics Society* 1985;33:463-466.
- Payne TH, Galvin M, Taplin SH, Austin B, Savarino J, Wagner EH. Practicing population-based care in an HMO: evaluation after 18 months. *HMO Practice* 1995;9:101-110.
- Rodney WM, Chopivsky P, Quan M. Adult immunization: the medical record design as a facilitator for physician compliance. *Journal of Medical Education* 1983;58:576-580.
- Rodriguez RM, Baraff LJ. Emergency department immunization of the elderly with pneumococcal and influenza vaccines. *Annals of Emergency Medicine* 1993;22:1729-1732.
- Shefer A, Briss P, Rodewald L, et al. Improving immunization coverage rates: an evidence-based review of the literature. *Epidemiologic Reviews* 1999;21:96-142.
- Task Force on Community Preventive Services. Introducing the Guide to Community Preventive Services: methods, first recommendations and expert commentary. *American Journal of Preventive Medicine* 2000;18(1, Supplement):1-142 .
- Task Force on Community Preventive Services. Vaccine-preventable diseases: improving vaccination coverage in children, adolescents, and adults. A report on recommendations of the Task Force on Community Preventive Services. *Morbidity and Mortality Weekly Report* 1999;48(RR-8):1-15.